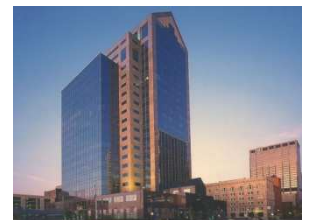




PPL companies

# NWS Winter Weather Workshop 2010 – 2009 Kentucky Ice Storm

*Keith Alexander  
November 17, 2010*



# Ice storm impact

- *Gov. Steve Beshear: 'Worst natural disaster in the history of Kentucky.'*
- *101 out of 120 counties declare state of emergency*
- *Federal Emergency Management Agency declares Ky. a disaster area*
- *KYEM and FEMA estimate damage at more than \$214 million*
- *First total call-up of Kentucky National Guard: 4,100 personnel*
- *Largest emergency generator placement: 160*
- *36 storm-related deaths*
- *Electric system devastation*
  - *Statewide outages: 769,000*
  - *E.ON U.S. outages: 404,000*
- *Surpassed all aspects of the Ike storm*



# The wicked weather begins

- *January 26: Light snow*
- *January 27 – 29: Intermittent freezing rain, rain and snow*
- *February 3 – 5: 20-mph wind gusts, sub-zero wind chill, snow*
- *Snow accumulation: 2 to 10 inches*
- *Ice accumulation: 1 to 3 inches*





# Ice loading devastates the electric system



# Energy Delivery implements crisis management process

## Work the Plan!





# Energy Delivery Operations – resource planning



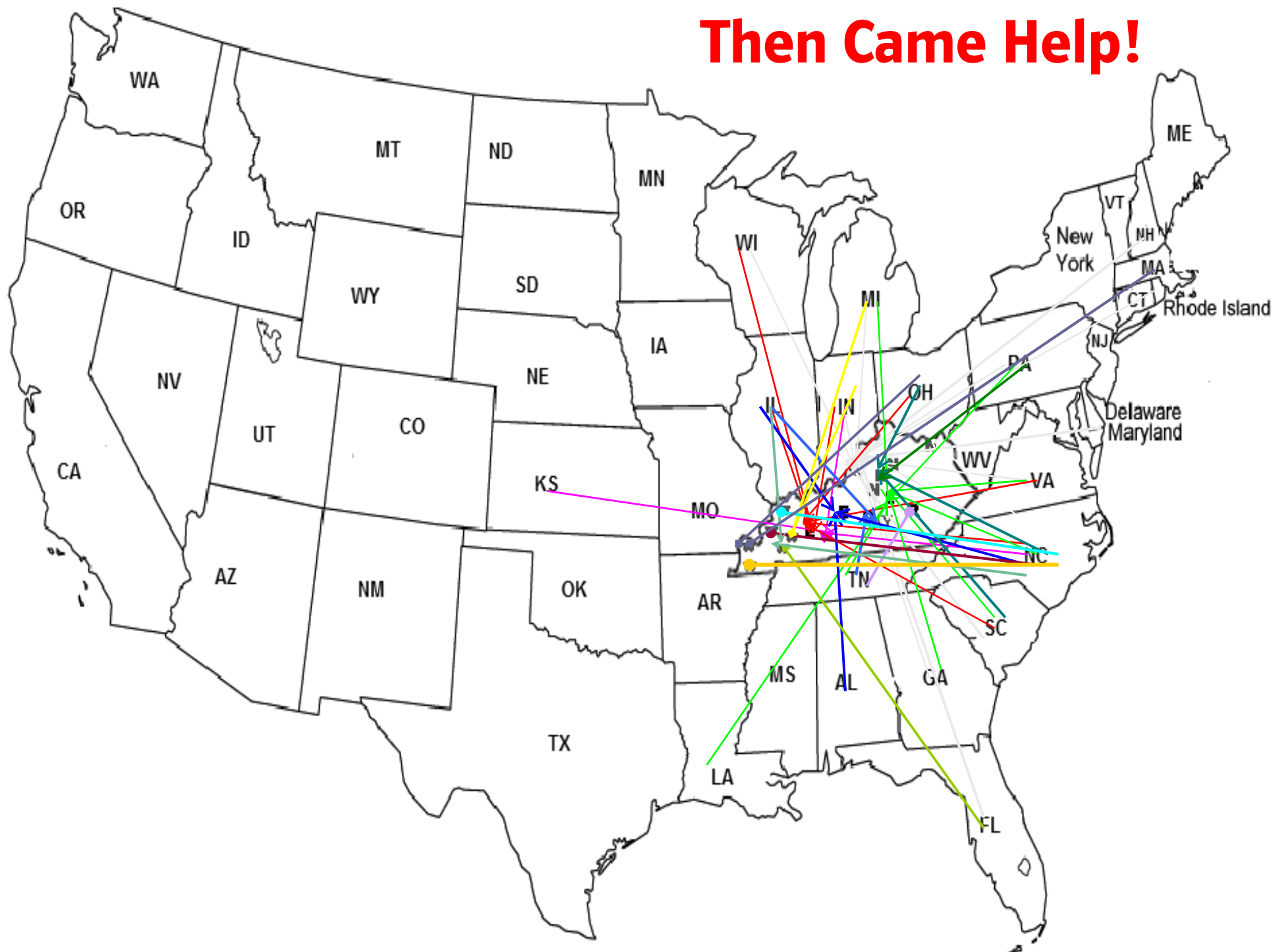
# Assistance arrives

- *Workers from 21 states, including Kentucky, lend assistance*
- *12 staging areas established in Louisville*
- *81,076 meals served*
- *3,600 vehicles on the road*
- *2.12 million miles driven*
- *284,000 gallons of fuel burned*



	2008 Wind Storm	2009 Ice Storm
Restoration workers	2,412	6,016
Restoration support	638	715
Total	3,050	6,731

## Then Came Help!





# Safety First — No Compromise!

- *Employee, contractor and public safety were a priority*
- *Passported/banded more than 5,000 visiting workers*
- *Many internal safety initiatives upheld standards and fostered worker safety*
- *PSRT protected the public from downed lines*
- *Public safety warnings issued via media and E.ON U.S. home page*



	Recordables	First-Aid Cases	Motor Vehicle Incidents
Employees	2	4	4
Contractors	11	4	11
Total	13	8	15

# Customers bombard call centers and business offices



**Outage Calls**

**2008  
Wind Storm**

418,000

**2009  
Ice Storm**

678,009

# Distribution system impact

- Heavy ice broke poles like toothpicks, and collapsed lines





# Distribution system impact



	<b>2008 Wind Storm</b>	<b>2009 Ice Storm</b>
Peak outages	376,000	404,000
Customers affected	500,000	686,000
Wires down	10,799	20,414
Poles broken	698	2,293
Circuits out	243	263
Substations affected	1	146

# Gas compressor stations

- *Muldraugh lost power*
- *Magnolia lost power and water*
- *Operated on back-up generators*
- *Averted a critical natural gas outage*



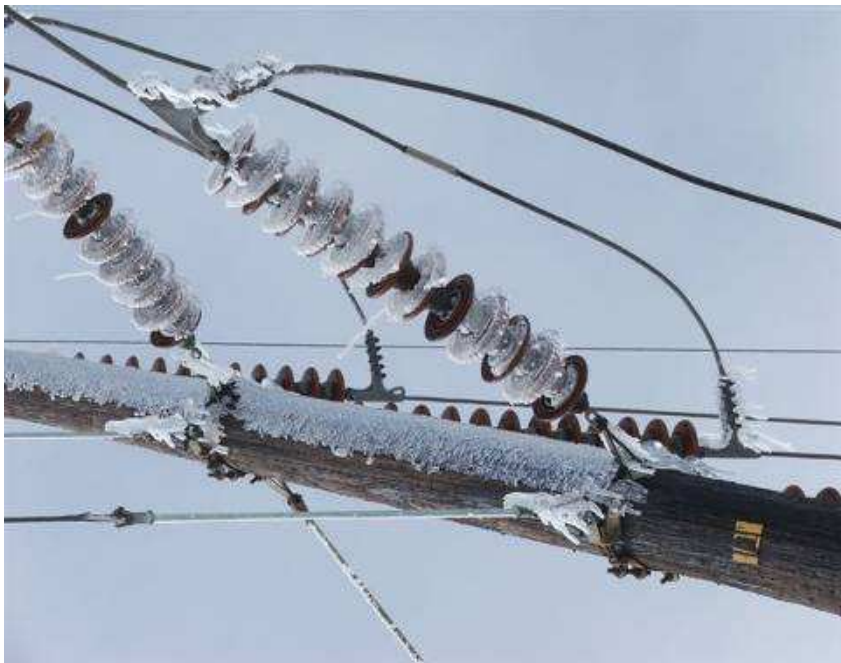
# Impact on transmission system

- *Nearly one-third of the system was out of service*
- *1,465 miles of lines unavailable*





# Ice loading on the entire system

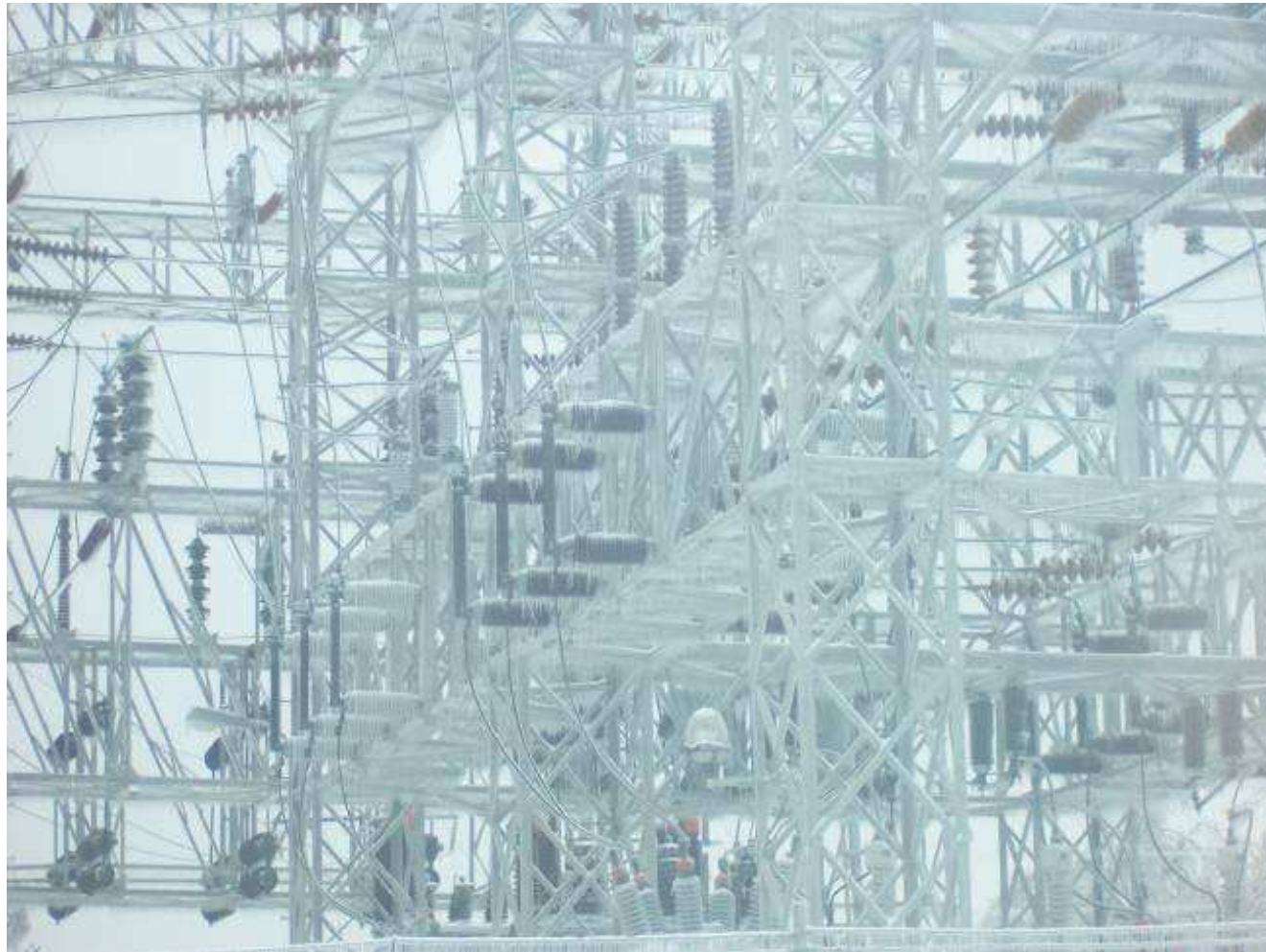


# Steel towers and poles collapsed



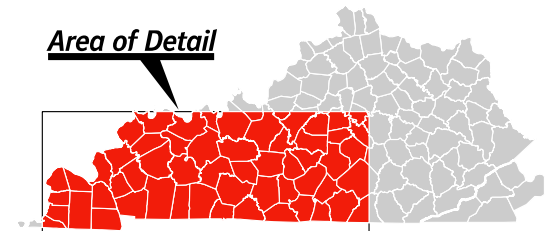


# Substation operations severely affected



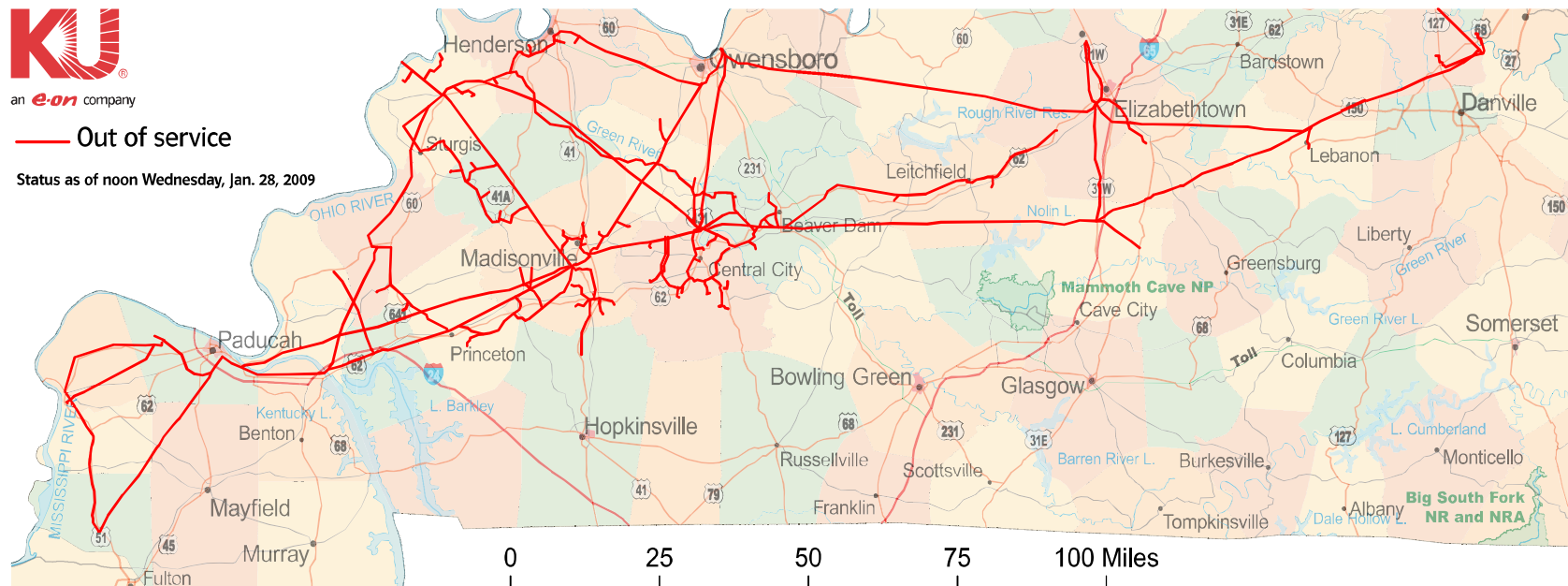


# Western Kentucky transmission lines devastated



— Out of service

Status as of noon Wednesday, Jan. 28, 2009



# Restoration begins





# Overall transmission impact

	2008 Wind Storm	2009 Ice Storm
Poles Broken	52	161
Spans Down	120	368
Circuits Out	41	105
Substations	0	62





# More than 800 megawatts of load impacted

Area	Load lost due to transmission outages (MW)	Total load (mw)	Percentage of total load
Western Ky. (KU)	562	562	100%
Other KU	182	3,482	5%
Total KU	744	4,044	18%
LG&E	91	1,828	5%
<b>Total</b>	<b>835</b>	<b>5,872</b>	<b>14%</b>

# Impact on Green River Power Station

- *Total loss of communication*
- *Total loss of station power outlets (transmission lines)*
- *Around-the-clock effort to protect damage to turbines*
- *Total team commitment*



# Post-storm review

- *Internal review*
- *Third-party critique*
  - *Operations*
  - *Circuit hardening*
  - *Online Outage Maps*
  - *Undergrounding*





# The bright side!

- *Teamwork and camaraderie*
- *Positive media coverage*
  - *Media calls: 1,500*
  - *TV stories: 1,000*
  - *Print stories: 60*
- *Positive response from customers*

